

**What is claimed is:**

1. A liquid crystal display having a plurality of stacked layers comprising:
  - a plurality of layers of liquid crystal material each having opposing surfaces;
  - a plurality of electrically conductive layers disposed so as to be located near both of said opposing surfaces of said liquid crystal layers, wherein only one of said electrically conductive layers is disposed between adjacent said liquid crystal layers, and
  - drive electronics adapted to apply the same voltages pulses to adjacent said liquid crystal layers along the only one said electrically conductive layer.
2. The liquid crystal display of claim 1 wherein said drive electronics includes one driver corresponding to each of said electrically conductive layers.
3. The liquid crystal display of claim 2 wherein said driver comprises multiple drive chips.
4. The liquid crystal display of claim 1 wherein said liquid crystal material comprises regions of liquid crystal dispersed in a polymer matrix.
5. The liquid crystal display of claim 4 wherein said liquid crystal material comprises bistable cholesteric liquid crystal.
6. The liquid crystal display of claim 1, wherein electrode lines of one of said electrically conductive layers are arranged perpendicular to electrode lines of an adjacent one of said electrically conductive layers.

7. The liquid crystal display of claim 1, wherein said display is comprised of a plurality of pixels, with each pixel including a sub-pixel from each of said plurality of layers of liquid crystal material, wherein when a pixel is to be updated, the sub-pixels are addressed in sequence, such that while one sub-pixel is addressed to impose a brightness state change on that sub-pixel the remaining sub-pixels of that pixel are simultaneously addressed to maintain their current brightness state.

8. The liquid crystal display of claim 1 comprising only a single substrate on which said layers of the display are supported.

9. A stacked liquid crystal display sequentially comprising the following stacked layers:

- a top electrode layer of electrodes;
- a first liquid crystal layer;
- an upper middle electrode layer of electrodes;
- a second liquid crystal layer;
- a lower middle electrode layer of electrodes;
- a third liquid crystal layer;
- a bottom electrode layer of electrodes, and
- a shared electrode addressing construction in which said upper middle electrode layer is adapted to enable driving of said first liquid crystal layer and said second liquid crystal layer and said lower middle electrode layer is adapted to enable driving of said second liquid crystal layer and said third liquid crystal layer.

10. The stacked liquid crystal display of claim 9, adapted such that a reflective state of a portion of said first liquid crystal layer corresponding to a pixel of said display is changed by providing a first non-zero voltage difference between an electrode of said top electrode layer and an electrode of said

upper middle electrode layer.

11. The stacked liquid crystal display of claim 10, adapted such that a reflective state of said portion of said first liquid crystal layer is maintained by providing a voltage difference less than a voltage threshold needed to change a reflective state of the liquid crystal between said top electrode layer and said upper middle electrode layer.

12. The stacked liquid crystal display of claim 10, adapted such that a reflective state of a portion of said second liquid crystal layer also corresponding to said pixel of said display is changed by providing a second non-zero voltage difference between an electrode of said upper middle electrode layer and an electrode of said lower middle electrode layer.

13. The stacked liquid crystal display of claim 12, adapted such that a reflective state of a portion of said third liquid crystal layer also corresponding to said pixel of said display is changed by providing a third non-zero voltage difference between an electrode of said lower middle electrode layer and an electrode of said bottom electrode layer.

14. The stacked liquid crystal display of claim 13, adapted such that said reflective states of said portions of said first, second and third liquid crystal layers all corresponding to said pixel of said display are updated sequentially in time to update a state of said pixel.

15. The stacked liquid crystal display of claim 13, adapted such that the reflective states of two of said portions of said first, second and/or third liquid crystal layers each corresponding to said pixel of said display are updated concurrently in time to at least partially update a state of said pixel.

16. The stacked liquid crystal display of claim 9, wherein said first liquid crystal layer, said second liquid crystal layer and said third liquid crystal layer comprise a dispersion of cholesteric liquid crystal in a polymer matrix.

17. The stacked liquid crystal display of claim 9, adapted such that a reflective state of a portion said first liquid crystal layer corresponding to a pixel of said display is changed by providing a voltage difference between an electrode of said top electrode layer and an electrode of said upper middle electrode layer, and adapted such that

a reflective state of a portion said second liquid crystal layer corresponding to said pixel of said display is changed by providing a voltage difference between an electrode of said upper middle electrode layer and an electrode of said lower middle electrode layer, and further adapted such that

a reflective state of a portion of said third liquid crystal layer corresponding to said pixel of said display is changed by providing a voltage difference between an electrode of said lower middle electrode layer and an electrode of said bottom electrode layer;

thereby updating a state of said pixel of said display.

18. The stacked liquid crystal display of claim 17 wherein a threshold voltage is needed to change a reflective state of the liquid crystal, said display being adapted such that

a reflective state of said portion of said first liquid crystal layer is maintained by providing a voltage difference between said electrode of said top electrode layer and said electrode of said upper middle electrode layer below said threshold voltage, and adapted such that

a reflective state of said portion of said second liquid crystal layer is maintained by providing a voltage difference between said electrode of said upper middle electrode layer and said electrode of said lower middle electrode layer below said threshold voltage, and further adapted such that

a reflective state of said portion of said third liquid crystal layer is maintained by providing a voltage difference between said electrode of said lower middle electrode layer and said electrode of said bottom electrode layer below said threshold voltage.

19. The stacked liquid crystal display of claim 18, further adapted such that the reflective states of two or more of said portions of said first, second, and third liquid crystal layers are updated sequentially in time.

20. The stacked liquid crystal display of claim 18, further adapted such that the reflective states of two or more of said portions of said first, second, and third liquid crystal layers are updated concurrently in time.

21. The stacked liquid crystal display of claim 18, further adapted such that the electrodes of one of said electrode layers are arranged perpendicular to the electrodes of an adjacent one of said electrode layers.

22. A stacked liquid crystal display comprising:  
a top electrode layer of electrodes;  
an upper middle electrode layer of electrodes;  
a first liquid crystal layer sandwiched between said top electrode layer and said upper middle electrode layer;  
a lower middle electrode layer of electrodes;  
a second liquid crystal layer sandwiched between said upper middle electrode layer and said lower middle electrode layer;  
a bottom electrode layer of electrodes;  
a third liquid crystal layer sandwiched between said lower middle electrode layer and said bottom electrode layer;  
wherein a pixel of said display includes a portion of said first liquid crystal layer adapted to be addressed by the combination of an electrode of said top electrode layer and an electrode of said upper middle electrode layer, and wherein

said pixel of said display further includes a portion of said second liquid crystal layer adapted to be addressed by the combination of an electrode of said upper middle electrode layer and an electrode of said lower middle electrode layer, and further wherein said pixel of said display further includes a portion of said third liquid crystal layer adapted to be addressed by the combination of an electrode of said lower middle electrode layer and an electrode of said bottom electrode layer.

23. The stacked liquid crystal display of claim 22, further adapted such that a brightness state of said pixel is updated by addressing said portions of said liquid crystal layers in sequence.

24. A stacked liquid crystal display comprising:
- a top electrode layer of electrodes;
  - an upper middle electrode layer of electrodes;
  - a first liquid crystal layer sandwiched between said top electrode layer and said upper middle electrode layer, adapted such that a brightness state of a portion said first liquid crystal layer corresponding to a pixel of said display is changed by providing a non-zero voltage difference between an electrode of said top electrode layer and an electrode of said upper middle electrode layer, and adapted such that a brightness state of said portion of said first liquid crystal layer is maintained by providing substantially no voltage difference between said electrode of said top electrode layer and said electrode of said upper middle electrode layer;
  - a lower middle electrode layer of electrodes;
  - a second liquid crystal layer sandwiched between said upper middle electrode layer and said lower middle electrode layer, adapted such that a brightness state of a portion said second liquid crystal layer corresponding to said pixel of said display is changed by providing a non-zero voltage difference between an electrode of said upper middle electrode layer and an electrode of said lower middle electrode layer, and adapted such that a brightness state of said portion of said second liquid crystal layer is maintained by providing substantially no voltage difference between said electrode of said upper middle electrode layer and said electrode of said lower middle electrode layer;
  - a bottom electrode layer of electrodes; and

a third liquid crystal layer sandwiched between said lower middle electrode layer and said bottom electrode layer, adapted such that

a brightness state of a portion of said third liquid crystal layer corresponding to said pixel of said display is changed by providing a non-zero voltage difference between an electrode of said lower middle electrode layer and an electrode of said bottom electrode layer, and adapted such that

a brightness state of said portion of said third liquid crystal layer is maintained by providing substantially no voltage difference between said electrode of said lower middle electrode layer and said electrode of said bottom electrode layer;

wherein said pixel is formed by a stacked arrangement of said portions of said first, second, and third liquid crystal layers such that a color of said pixel is formed by light reflecting from all of said portions of said first, second, and third liquid crystal layers, and further

wherein a brightness state of said pixel of said display is updated by changing and/or maintaining the brightness states of said portions of said first, second, and third liquid crystal layers sequentially or concurrently.

25. The stacked liquid crystal display of claim 24, wherein one or more of said first, second, and third liquid crystal layers include bistable cholesteric liquid crystal material.

26. A multi-layer stacked liquid crystal display film comprising:  
a plurality of liquid crystal film layers; and  
a plurality of electrode film layers for driving said plurality of liquid crystal film layers, wherein



all of said film layers are printed or coated in a stack upon each other,  
wherein

a pixel is formed from a portion of each of said plurality of liquid crystal  
layers, such that a color or shade of said pixel is formed by light  
reflecting from all of said portions of said plurality of liquid crystal  
layers, and wherein

at least one of said plurality of electrode layers is adapted to enable  
driving of two adjacent said liquid crystal layers.

27. The stacked liquid crystal display film of claim 26, wherein each  
of said portions of said plurality of electrode layers is driven sequentially in  
time to change or maintain said color of said pixel.

28. A stacked liquid crystal display comprising a base substrate and  
a plurality of film layers printed or coated onto each other in a stack and  
supported on said substrate, said film layers comprising:

a plurality of conducting film layers; and

a plurality of liquid crystal dispersion film layers each comprising  
regions of liquid crystal material dispersed in a polymer matrix,  
said liquid crystal dispersion layers being separated by said  
conducting layers, wherein

at least one of said plurality of conducting layers is adapted to enable  
driving of two adjacent said liquid crystal dispersion layers.

29. The display of claim 28 comprising flexible interconnects extending  
from each of said conducting film layers at a side of said display  
to conductors located on said substrate at the same side of said  
display.

30. The display of claim 28 wherein said plurality of liquid crystal  
dispersion layers includes at least three liquid crystal dispersion layers  
including bistable cholesteric liquid crystal material.

31. The display of claim 28 wherein said plurality of liquid crystal dispersion layers includes at least six liquid crystal dispersion layers including bistable cholesteric liquid crystal material.

32. A liquid crystal display comprising:  
a first liquid crystal layer comprising liquid crystal that is bistable in an absence of an electric field;  
a second liquid crystal layer comprising liquid crystal that is bistable in an absence of an electric field stacked upon said first liquid crystal layer, wherein said liquid crystal is a dispersion of liquid crystal in a polymer matrix;  
a first electrode layer disposed between said first liquid crystal layer and said second liquid crystal layer;  
a second electrode layer disposed between said first liquid crystal layer and said second liquid crystal layer;  
electrical interconnects that electrically connect said first electrode layer and said second electrode layer together in parallel; and  
drive electronics electrically connected to said electrical interconnects adapted to address both of said first liquid crystal layer and said second liquid crystal layer with the same voltage pulses.

33. The liquid crystal display of claim 32, wherein said liquid crystal layers reflect visible and infrared light.

34. A liquid crystal display comprising:  
a first liquid crystal layer comprising liquid crystal that is bistable in an absence of an electric field;  
a second liquid crystal layer comprising liquid crystal that is bistable in an absence of an electric field stacked upon said first liquid crystal layer, wherein said first liquid crystal layer and said second liquid crystal layer comprise a dispersion of bistable cholesteric liquid crystal material in a polymer matrix;

only a single electrode layer disposed between said first liquid crystal layer and said second liquid crystal layer; and  
drive electronics electrically connected to said single electrode layer adapted to address both said first liquid crystal layer and said second liquid crystal layer with the same voltage pulses.